

The Burden of Asthma

in Washington State

Appendices

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Appendix A: Data Sources

Death Certificates

Asthma mortality data were obtained through the Washington State Death Certificate System. This system collects data on all deaths in Washington, and those of Washington residents who die in other states. Data collected for each death include: age, gender, race/ethnicity, date of death, underlying and contributing cause of death, place of residence, place of occurrence, and zip code of residence. The data are estimated to be 99% complete.

Classification and coding of data on Washington death records follow the National Center for Health Statistics (NCHS) guidelines as defined in *Vital Statistics Instruction Manuals* parts 1 – 20 (Published by US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Health Statistics, Hyattsville MD). Causes of death are coded according to the International Classification of Disease, World Health Organization, Ninth Revision (ICD-9) for 1979 – 1998; Tenth Revision (ICD-10) for 1999 and later. The change from ICD-9 to ICD-10 coding is reflected in Figure 1 by the break in trendline between 1998 and 1999.

Issues related to reported race/ethnicity

Death certificates use open-ended reporting of race, allowing for multiple racial entries. However, the multiple race data have not been used in this report because they are of uncertain quality and completeness. The determination of race when more than one race is reported follows decision rules established by the National Center for Health Statistics (NCHS). In most cases, the first race given is assigned as the person's race.

Reporting of race/Hispanic origin on death certificates is sometimes based on observing the decedent rather than questioning the next of kin. This procedure causes an underestimate of deaths for certain groups, particularly Native Americans, some of the Asian subgroups, and Hispanics. Thus, death rates based on death certificate data are lower than true death rates for these groups. For more information, see *Quality of Death Rates by Race and Hispanic Origin: A Summary of Current Research, 1999*:

http://www.cdc.gov/nchs/products/pubs/pubd/series/sr02/130-121/sr2_128.htm

Hispanic origin was added as an ethnic category in the vital records system and collected as a separate item (in addition to race) in 1988. Prior to 1988, Hispanic data were provided by a racial category of "Mexican/Chicano" or "Mexican American." In a few instances, Hispanic ethnicity is marked unknown, and Hispanic is given as the person's race. Beginning in 1992, if a person's ethnicity is marked as unknown and his/her race is given as Hispanic, then that person's ethnicity is counted as Hispanic. About 60 deaths each year are reclassified in this way. However, the increase results in a 14% increase in the number of Hispanics at death.

Caveats

- Unless otherwise noted, the mortality rates in this report use the underlying cause of death. For example, if a person dies of a brain tumor that has spread to the brain from a tumor in the breast, the underlying cause is reported as breast cancer. Likewise, if a

person dies of asthma as a complication of a stroke, the underlying cause of death is reported as a stroke.

National Data

- National death data are available from several sources within the federal government. Sources used in The Health of Washington State are referenced in each chapter.

For Further Information

Washington State Department of Health, Center for Health Statistics, (360) 236-4324
<http://www.doh.wa.gov/EHSPHL/CHS/CHS-Data/death/deatmain.htm>

Hospitalization Data

Asthma hospitalization data was obtained through the DOH Comprehensive Hospital Abstract Reporting System (CHARS) and the Oregon Hospital Discharge Data (OHDD). Data for Washington residents hospitalized for asthma in Oregon represent fewer than 75 cases per year in recent years (estimated using years 2000-2002).

It should be noted that these figures represent hospitalizations, not individuals. As patients with asthma may be hospitalized multiple times per year, these rates likely over-estimate the number of patients per year hospitalized for asthma. Data on race or ethnicity are not available for hospitalization on either the state or national level.

CHARS includes data from all inpatient stays for all patients treated in state-licensed acute care hospitals in Washington, regardless of patient residence. CHARS does not include hospitalizations in U.S. military hospitals, U.S. veterans administration hospitals, or Washington State psychiatric hospitals. For each hospitalization CHARS data includes: hospital, zip code of residence, birthdate, age, gender, discharge status, and primary and secondary diagnoses.

We used cases where the primary diagnosis listed was asthma (ICD-9: 493), and age-adjusted rates to the US age distribution for the year 2000 (US Census Bureau). Reasons for hospitalization are coded according to the International Classification of Disease, Clinical Modification of the Ninth Revision (ICD-9-CM). The first diagnosis field is considered to be the principal reason the patient was admitted to the hospital. Beginning in 1993, there are up to eight other diagnosis fields for additional conditions that had an effect on the hospitalization.

National Data

As a comparison, we used US asthma hospitalization data from the National Hospital Discharge Survey for 1980 to 2001:

<http://www.cdc.gov/nchs/about/major/hdasd/nhds.htm>

Caveats

- Unless otherwise noted, the unit of observation is the hospitalization episode not the individual. Thus, one person hospitalized several times will be counted several times. The number of hospitalizations gives us a better picture of the public health impact of

a condition. Each hospitalization for an illness or injury is an adverse event for the person who experiences it. Many hospitalizations are potentially avoidable through reductions in the factors that cause or complicate diseases and injuries or through early detection and rapid treatment. In addition, because records in OHDD do not include a patient identifier, it is not possible to count individuals when using a combined CHARS-OHDD dataset.

- Hospitalization excludes emergency room visits, outpatient surgery, outpatient clinics, military and VA hospitals (greatest impact on Island county because of the large proportion of residents connected with the military), free-standing surgeries, free standing mental health, substance abuse, and rehabilitation centers, birthing centers.
- CHARS does not contain data on Washington residents hospitalized outside of Washington. Data on Washington residents hospitalized in Oregon are obtained through the OHDD. However, hospitalization data are not available for Washington residents hospitalized in other states, and OHDD cannot always be combined with CHARS, as for example, when one wants to count individuals and not hospitalizations. This situation affects border counties, especially those adjacent to larger population centers in other states. Asotin and Garfield counties are particularly affected by hospitalization in Idaho.
- Residence is based on five-digit ZIP codes. In this report, ZIP codes have been assigned to county based on US postal service conventions that assign ZIP codes to counties based on the physical location of the post office. When ZIP codes cross county borders, some hospitalizations are assigned to the wrong county. This phenomenon may be most important for Skamania. ZIP code 98671 includes a large portion of Skamania, but all hospitalizations in that ZIP code are assigned to Clark County. Other counties are less affected, because the number of hospitalizations that are potentially assigned to the wrong county are a relatively small proportion of the total hospitalizations for that county.
- No race/ethnicity data are collected

For Further Information

[Washington State Department of Health Hospital Data Page](#)

Washington State Department of Health, Center for Health Statistics (360) 236-4223. The Washington State Department of Health does not release record-level data from OHDD. For additional information on OHDD, contact the Oregon Office for Health Policy and Research at (503) 378-2422 x414.

Behavioral Risk Factor Surveillance System (BRFSS)

The Behavioral Risk Factor Surveillance System (BRFSS) is a statewide random-digit-dialing telephone survey coordinated by the Centers for Disease Control & Prevention (CDC) and conducted in all 50 states. Interviews were conducted on a monthly basis and combined by calendar year, and weighted to be representative of the adult population of Washington. Adult asthma prevalence was based on whether a respondent reported *current* asthma. Respondents were also questioned about the number of children living in

the household and the number of children in the household who have ever been diagnosed with asthma and who currently have asthma. Childhood asthma prevalence was based on the total number of children with current asthma divided by the total number of children in households surveyed. In 2001 a module was included in the survey to ask about specific healthcare and symptoms among adult respondents with asthma.

Caveats

- The response rate for the BRFSS changed from 61% in 1995 to 44% in 2000. Similar changes have been seen in all other states and in other telephone surveys. The drop is due to a combination of people being less willing to cooperate and new technology allowing people to screen phone calls. CDC has assessed the impact of low response rates and has concluded that as long as the response rate is between 30% and 80%, the results are not biased due to response rate.
- BRFSS might under-represent poorer, more mobile, and non-white populations because they are less likely to live in homes with telephones. For example, based on 1990 census data, the mean income for household with telephones was \$37, 613 and the mean income for households without telephones was \$15,650. Moreover, 3.1% of whites did not have a phone compared to 8.3% of non-whites. (See [*Washington State Population Survey—Characteristics of Households With and Without Telephones: Analysis with 1999 Census Data.*](#))
- Washington's BRFSS did not represent people who do not speak English until 2003, when the survey was conducted in both English and Spanish
- BRFSS does not represent people who live in institutions.
- Characteristics of people who refuse to participate are unknown.
- Health risk behavior might be underestimated because people might be reluctant to report behaviors that others might not find acceptable.
- Use of preventive services might be underestimated because of recall error.

National Data

- National BRFSS data used in this report are from CDC Division of Adult and Community Health, Behavioral Risk Factor Surveillance System Online Prevalence Data, <http://apps.nccd.cdc.gov/brfss>.

For Further Information

Washington State Department of Health, Center for Health Statistics (360) 236-4322.
Washington State BRFSS web site: http://www.doh.wa.gov/EHSPHL/CHS/CHS-Data/brfss/brfss_homepage.htm

Washington State Healthy Youth Survey (HYS)

The HYS is a “pencil-and-paper” school based survey of adolescents in grades 6,8,10 and 12 administered in the classroom. It is intended to monitor health-risk behaviors that contribute to morbidity, mortality, and social problems among youth and adults in the United States.

The survey is administered in the fall of even years. There are three forms: students in grades 8, 10, and 12 randomly receive either Form A (based on the national Monitoring the Future survey and the Communities that Care survey) or Form B (based on the national Youth Risk Behavior Survey and the Youth Tobacco Survey). Students in grade 6 receive a shorter survey that contains simplified elements of forms A and B.

Local communities are offered the opportunity to participate in the survey in order to collect data for program planning and evaluation. Only schools selected as part of a random state-level sample are included in this report.

Caveats

- The estimated response rate for the 2004 survey was greater than 60% for 6th, 8th and 10th grades, but between 40-50% for 12th grade
- Youth who do not attend public schools are not represented in the findings (attending private school, tribal school, early completion of school or dropping out of school, youth in juvenile detention facilities)
- Youth may not accurately report medical information, including frequency of medical visits or treatment for asthma

For Further Information

Washington State Department of Health, Healthy Youth Survey website:
<http://www3.doh.wa.gov/hys>

Washington State Healthy Worksite Survey

In 2004 the Tobacco Prevention and Control Program sponsored a survey of more than 2000 businesses with at least 50 employees to assess tobacco-related policies and procedures. The survey utilized a random sample from licensed businesses in Washington, and was administered by telephone with options for email or faxed survey completion. The Human Resources Manager was requested as the respondent, and was asked about healthcare benefits, smoking policies indoors at the worksite, and tobacco cessation benefits for employees. The survey was conducted by Gilmore Research.

Caveats

- Data represent only large employers, and small employers may have different policies or procedures

For Further Information

Washington State Steps to a HealthierWA Program. (360) 236-3632.

School Health Education Profile (SHEP)

SHEP is a CDC-sponsored survey implemented in Washington State jointly by OSPI and the Department of Health. A random sample of Washington secondary schools is drawn (junior high, middle school, high schools) and surveys are sent to the principal and to the lead health teacher. The survey includes questions about school policies, procedures, and health education curriculum. In 2004, there were about 300 principals who responded and the response rate for the survey was greater than 70%.

Caveats

- School staff may report the existence of policies or procedures that are not implemented consistently

For Further Information

Centers for Disease Control and Prevention, Division of Adolescent and School Health:
<http://www.cdc.gov/healthyyouth/profiles/>

School Nurse Corps Data

The Office of the Superintendent of Public Instruction (OSPI) coordinates school nurse services for many public school districts (class II districts) through Educational Service District (ESD) cooperatives. The “School Nurse Corps” nurses provide information to OSPI about services for students with asthma and diabetes on an annual basis. Some school districts (class I districts) coordinate their own nursing services, and provide information about services to OSPI on a voluntary basis. For the 2002-03 school year, School Nurse Corps data were available for 68 Class I districts and 189 Class II districts, a total of 257 (87%) of Washington’s 296 school districts. For the 2003-04 school year data were available from 66 Class I (63% of total) and 187 Class II (98% of total) districts, for a total of 253 (85% of all school districts). For 2002-03 the reporting schools represent 63% of the public school population, and for 2003-04 they represent 66% of the population.

In contrast to SHEP data, School Nurse Corps data describe asthma-related services for students in all grades rather than only for secondary schools.

Caveats

- Not all school districts report school nurse corps data to OSPI
- School nurse corps data do not include information from private schools.

For more information

Office of Superintendent of Public Instruction Health Services
<http://www.k12.wa.us/HealthServices/default.aspx>

Appendix B: Data Tables

In this appendix data used to create graphs or charts in the report are presented, with 95% confidence intervals when available. Tables are labeled “Figure” to correspond explicitly with the appropriate graphs or charts in the report.

When data presented are for proportional distributions totals may not sum to exactly 100% due to rounding.

Generally, when prevalence of a condition was differentially associated with school grade (6th, 8th, 10th, 12th) results are stratified by grade. When prevalence of a condition was not differentially associated with grade, results were combined to provide a single point estimate.

Figure 1: Trends for asthma deaths, WA and US

rate per 100,000				
Year	US	WA	95% CI	WA-Count
1980	1.4	1.7	(1.3 , 2.3)	64
1981		1.6	(1.2 , 2.1)	63
1982		2.1	(1.6 , 2.7)	82
1983		1.8	(1.4 , 2.4)	75
1984		1.9	(1.5 , 2.4)	80
1985	1.8	1.8	(1.4 , 2.3)	74
1986		1.9	(1.5 , 2.4)	83
1987		2.3	(1.8 , 2.8)	103
1988		2.0	(1.6 , 2.5)	88
1989		2.1	(1.7 , 2.6)	99
1990	2.0	2.5	(2.0 , 3.0)	106
1991		2.2	(1.8 , 2.7)	97
1992		2.4	(2.0 , 2.9)	110
1993		2.0	(1.6 , 2.5)	94
1994		2.3	(1.9 , 2.8)	110
1995	2.2	2.3	(1.9 , 2.7)	112
1996	2.2	2.2	(1.8 , 2.7)	113
1997	2.1	1.7	(1.4 , 2.1)	91
1998	2.0	1.4	(1.1 , 1.8)	77
1999	1.7	1.6	(1.3 , 2.0)	88
2000	1.6	1.5	(1.2 , 1.9)	84
2001	1.5	1.5	(1.2 , 1.9)	85
2002	1.5	1.6	(1.3 , 2.0)	93

Source: 1980-2002 National Death Certificates, Washington State Death Certificates. Asthma as primary cause of death. Rates per 100,000, age-adjusted to 2000 US population. Data format changed between 1998 and 1999, indicated on chart by discontinuous line. US estimates were not available for years between 1980, 1985, 1990 and 1995.

Figure 2: Trends for asthma hospitalizations, WA and US

rate per 100,000				
Year	US	WA	95% CI	WA-Count
1995	195.0	101.7	(99.0 , 104.4)	5,556
1996	179.0	94.9	(92.4 , 97.6)	5,256
1997	181.0	98.0	(95.4 , 100.7)	5,520
1998	157.0	86.1	(83.7 , 88.5)	4,909
1999	176.0	90.2	(87.7 , 92.7)	5,192
2000		91.8	(89.3 , 94.3)	5,323
2001		88.9	(86.5 , 91.4)	5,203
2002		93.8	(91.4 , 96.4)	5,540

Source: National Hospital Discharge Survey, Washington State Comprehensive Hospital Abstract Reporting System (CHARS). Asthma as principal diagnosis, age-adjusted to 2000 US Population. US data were not available for more recent than 1999 at the time of this report.

Figure 3: Prevalence of urgent medical visits for asthma during past year, among Washington adults with asthma

	%	95% CI
Visited Emergency Room	12.4%	(8.9% , 17.0%)
Visited Doctor for worsening symptoms	24.6%	(19.8% , 30.1%)

Source: 2001 Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Figure 4: Prevalence of emergency room/urgent care visits during past year, among Washington youth with asthma

	%	95% CI
8th grade	23.6%	(17.7% , 30.7%)
10th grade	18.1%	(13.3% , 24.1%)
12th grade	16.8%	(11.8% , 23.3%)
total	19.4%	(16.1% , 23.1%)

Source: 2004 Washington State Healthy Youth Survey (HYS).

Figure 5: Distribution of emergency room/urgent care visits for asthma during past year, among Washington youth with asthma who visited ER/urgent care facilities

	%	95% CI
one to three visits	82.6%	(75.2% , 88.2%)
four to nine visits	13.0%	(8.1% , 20.4%)
ten to twelve visits	1.7%	(0.4% , 6.7%)
more than twelve visits	2.6%	(0.9% , 7.6%)

Source: 2004 Washington State Healthy Youth Survey (HYS). Combined 8-10-12th grade estimate

Figure 6: Estimated annual economic costs of asthma, Washington State and US

Annual Costs	US 2002	WA 2002
Direct Medical Expenditures		
Hospital care		
Hosp. Inpt. Care	\$2,592,000,000	\$68,000,000
ED care	\$725,700,000	\$19,000,000
Hosp outpt. Care	\$960,000,000	\$25,200,000
Physician services		
Physician inpatient care	\$125,900,000	\$3,300,000
Physician office visits	\$843,300,000	\$22,100,000
Prescriptions	\$3,901,900,000	\$102,300,000
All direct expenditures	\$9,148,800,000	\$239,900,000
Indirect costs		
School days lost	\$1,321,500,000	\$34,700,000
Loss of work/Outside Employment		
Men	\$495,300,000	\$13,000,000
Women	\$1,346,400,000	\$35,300,000
Housekeeping	\$1,004,500,000	\$26,300,000
Mortality	\$2,164,700,000	\$56,800,000
All indirect costs	\$6,332,300,000	\$166,100,000
Total Costs		
Direct and Indirect Costs	\$15,481,200,000	\$406,000,000

Estimates are synthetic based on published economic literature. Estimated rounded to nearest \$100,000. See technical notes for additional discussion of economic estimates.

Figure 7: Distribution of asthma symptom frequency in past month, among Washington adults with asthma

Past Month	%	95% CI
None	23.3%	(18.5% , 28.8%)
Less than weekly	21.9%	(17.4% , 27.3%)
Weekly, but not daily	17.0%	(12.8% , 22.3%)
Between 2-6 days per week	15.8%	(11.9% , 20.7%)
Daily, but not all day	14.6%	(11.0% , 19.1%)
Every day, all the time	7.5%	(4.8% , 11.4%)
Past year		
At least one asthma attack	56.3%	(50.0% , 62.4%)

Source: 2001 Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Figure 8: Distribution of asthma symptom frequency in past month, among Washington youth with asthma

	%	95% CI
None	21.0%	(18.1% , 24.2%)
Less than once a week	27.2%	(23.2% , 31.6%)
Once or twice a week	19.8%	(16.9% , 23.1%)
Between 2-6 times per week	16.3%	(13.3% , 19.7%)
Daily, but not all day	12.3%	(9.8% , 15.3%)
Every day, all the time	3.5%	(2.2% , 5.6%)

Source: 2004 Washington State Healthy Youth Survey (HYS), grades 8-10-12 combined

Figure 9: Distribution of asthma-related sleep disturbance frequency in past month, among Washington adults with asthma

	%	95% CI
0 days	48.8%	(41.7% , 55.9%)
1-2 days	21.2%	(16.0% , 27.7%)
3-5 days	14.1%	(9.8% , 19.9%)
6-10 days	6.0%	(3.5% , 10.0%)
more than 10 days	10.0%	(6.7% , 14.6%)

Source: 2001 Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Figure 10: Distribution of asthma-related sleep disturbance frequency in past month, among Washington youth with asthma

	%	95% CI
0 days	64.9%	(60.6% , 68.9%)
1-2 days	21.7%	(18.7% , 25.1%)
3-4 days	6.5%	(4.8% , 8.7%)
5-10 days	2.7%	(3.0% , 6.1%)
more than 10 days	4.3%	(3.0% , 6.1%)

Source: 2004 Washington State Healthy Youth Survey (HYS), grades 8-10-12 combined

Figure 11: Distribution of days adults could not do usual activities because of asthma during previous year, among Washington adults with asthma

	%	95% CI
0 days	71.4%	(65.4% , 76.7%)
1-12 days	20.6%	(16.1% , 26.1%)
13-50 days	3.8%	(2.0% , 6.8%)
51-100 days	1.4%	(0.4% , 4.1%)
more than 100 days	2.9%	(1.3% , 6.5%)

Source: 2001 Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Figure 12: Percent of youth who missed school because of asthma during previous year, among Washington youth with asthma

	%	95% CI
8th grade	38.3%	(30.8% , 46.5%)
10th grade	29.7%	(23.3% , 36.9%)
12th grade	24.1%	(18.4% , 30.9%)

Source: 2004 Washington State Healthy Youth Survey (HYS), among youth with current asthma.

Figure 13: Distribution of days Washington youth missed school during the previous year because of asthma, among youth with asthma who missed any school days

	%	95% CI
1-2 days	58.9%	(51.3% , 66.0%)
3-4 days	21.2%	(15.7% , 27.9%)
5-10 days	12.0%	(7.6% , 18.5%)
11 or more days	8.0%	(4.4% , 14.1%)

Source: 2004 Washington State Healthy Youth Survey (HYS), grades 8-10-12 combined

Figure 14: Prevalence of poor health/limited activities by asthma status, among Washington adults

	Poor Health		Limited Activities	
	%	95% CI	%	95% CI
Non-Asthmatics	12.5%	(11.9% , 13.2%)	22.0%	(21.2% , 22.8%)
Adults with Asthma	26.1%	(23.7% , 28.8%)	38.3%	(35.5% , 41.2%)
Total	13.7%	(13.1% , 14.4%)	23.5%	(22.7% , 24.2%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 15: Prevalence of disability and limited activities by asthma status, among Washington(10th grade)

	Report having Disability		Others think you have a Disability		Limited activities because of Disability	
	%	95% CI	%	95% CI	%	95% CI
Non-Asthmatics	9.8%	(9.0% , 10.6%)	8.4%	(7.7% , 9.2%)	6.7%	(6.0% , 7.6%)
Youth with Asthma	38.2%	(34.0% , 42.6%)	20.1%	(17.1% , 23.4%)	24.1%	(20.5% , 28.1%)

Source: 2002 and 2004 combined Washington State Healthy Youth Survey (HYS).

Figure 16: Prevalence of high academic performance by asthma status and symptom severity, among Washington youth (10th grade)

	%	95% CI
No asthma	69.6%	(67.1% , 71.9%)
Mild intermittent	71.8%	(69.1% , 74.3%)
Mild persistent	67.4%	(60.5% , 73.7%)
Moderate persistent	55.4%	(45.0% , 65.4%)
Severe persistent	39.6%	(26.7% , 54.1%)

Source: 2002 and 2004 combined Washington State Healthy Youth Survey (HYS).

Figure 17: Prevalence of depression by asthma status, among Washington adults

	%	95% CI
Non-Asthmatics	18.6%	(17.4% , 19.9%)
Adults With Asthma	27.4%	(23.0% , 32.3%)
Total	19.4%	(18.2% , 20.6%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 18: Prevalence of depression and suicidal thoughts by asthma status, among Washington youth

	Depressed		Suicidal Thoughts	
	%	95% CI	%	95% CI
Non-Asthmatics	28.1%	(27.3% , 28.9%)	14.7%	(14.0% , 15.3%)
Youth with Asthma	37.6%	(35.2% , 40.0%)	20.8%	(18.7% , 22.8%)

Source: 2002 and 2004 HYS combined, grade standardized for equal distributions of 8th-10th-12th respondents.

Figure 19: Age at diagnosis of asthma, among Washington adults

	Younger than 18		Older than 18	
	%	95% CI	%	95% CI
Adults with Asthma	23.4%	(18.5% , 29.0%)	76.6%	(70.9% , 81.4%)

Source: 2001 Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Figure 20: Prevalence of lifetime and current asthma among Washington adults

	%	95% CI
Current Asthma	9.1%	(8.6% , 9.6%)
Former Asthma	4.4%	(4.1% , 4.8%)
Never Had Asthma	86.5%	(85.9% , 87.1%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Figure 21: Prevalence of lifetime and current Asthma by grade, among Washington youth (youth self-reported)

	6th grade		8th grade		10th grade		12th grade	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Lifetime	13.6%	(12.7% , 14.5%)	17.1%	(15.9% , 18.3%)	19.9%	(18.3% , 21.5%)	19.3%	(17.6% , 21.0%)
Past Year	8.7%	(8.1% , 9.3%)	19.2%	(18.0% , 20.4%)	22.1%	(20.3% , 23.9%)	23.6%	(21.9% , 25.3%)
Current	6.9%	(6.3% , 7.5%)	8.8%	(7.9% , 9.7%)	10.0%	(8.8% , 11.2%)	9.2%	(8.1% , 10.3%)

Source: combined 2002 and 2004 Washington State Healthy Youth Survey (HYS)

Figure 22: Prevalence of current asthma among Washington children and youth (parent/adult proxy-reported)

	%	95% CI
0-4 years	5.0%	(3.8% , 6.5%)
5-12 years	8.9%	(7.6% , 10.5%)
13-17 years	8.8%	(7.2% , 10.7%)

Source: 1999 and 2000 combined Behavioral Risk Factor Surveillance System, parent (proxy) reports for child asthma prevalence

Figure 23: Trends for current asthma among Washington State and US adults

Washington			US		
Year	%	95% CI	%	95% CI	
1999	7.0%	(6.1% , 7.9%)	NA	NA	NA
2000	8.2%	(7.2% , 9.2%)	7.2%	(7.0% , 7.4%)	
2001	7.7%	(6.8% , 8.5%)	7.2%	(7.0% , 7.4%)	
2002	8.9%	(7.8% , 9.9%)	7.5%	(7.3% , 7.7%)	
2003	9.1%	(8.6% , 9.6%)	7.9%	(7.7% , 8.1%)	

Source: 1999-2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS), National BRFSS median

Figure 24: Trends for current asthma among Washington State and US youth

Washington			US	
Year	%	95% CI	%	95% CI
2000			6.1%	(5.2% , 6.9%)
2001			5.9%	(5.1% , 6.7%)
2002	8.5%	(8.0% , 9.0%)	5.9%	(5.1% , 6.7%)
2003			5.9%	(5.1% , 6.7%)
2004	8.7%	(8.2% , 9.2%)		

Source: 2002 and 2004 Washington State Healthy Youth Survey, grade-standardized estimate for 6th-12th grades combined; 2000-2003 National Health Interview Survey, youth aged 12-17 combined.

Figure 25: Trend for Washington households with children who have asthma, among households with children

Current Asthma			Lifetime Asthma	
Year	%	95% CI	%	95% CI
1999	10.0%	(8.5% , 11.7%)	16.1%	(14.2% , 18.1%)
2000	9.1%	(7.6% , 10.8%)	14.7%	(12.9% , 16.8%)
2001	11.6%	(10.1% , 13.3%)	16.7%	(14.9% , 18.7%)
2003	11.5%	(10.3% , 12.9%)	16.8%	(15.3% , 18.4%)

Source: 1999, 2000, 2001, 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 26: Prevalence of lifetime asthma by grade and gender, among Washington youth

6th grade			8th grade		10th grade		12th grade	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Female	12.7%	(11.8% , 13.6%)	17.0%	(15.8% , 18.2%)	19.8%	(18.2% , 21.6%)	20.7%	(19.1% , 22.5%)
Male	14.1%	(13.2% , 15.1%)	17.9%	(16.6% , 19.2%)	18.8%	(17.3% , 20.5%)	17.6%	(15.9% , 19.5%)
Total	13.4%	(12.7% , 14.2%)	17.4%	(16.5% , 18.3%)	19.4%	(18.1% , 20.7%)	19.3%	(17.9% , 20.7%)

Source: combined 2002 and 2004 Washington State Healthy Youth Survey (HYS).

Figure 27: Prevalence of current asthma by grade and gender, among Washington youth

	6th grade		8th grade		10th grade		12th grade	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Female	6.8%	(6.2% , 7.4%)	9.5%	(8.7% , 10.4%)	11.4%	(10.2% , 12.6%)	10.9%	(9.7% , 12.2%)
Male	7.1%	(6.4% , 7.8%)	8.1%	(7.2% , 9.0%)	7.9%	(7.0% , 8.9%)	7.0%	(6.1% , 8.1%)
Total	6.9%	(6.4% , 7.4%)	8.8%	(8.2% , 9.5%)	9.7%	(8.9% , 10.7%)	9.1%	(8.3% , 10.0%)

Source: combined 2002 and 2004 Washington State Healthy Youth Survey (HYS).

Figure 28: Prevalence of current asthma by age and gender, among Washington adults, 2001-03 combined

	Asthma Men		Asthma Women		Asthma Combined	
	%	95% CI	%	95% CI	%	95% CI
Age 18-24	6.6%	(4.8% , 9.0%)	12.6%	(10.0% , 15.7%)	9.5%	(7.8% , 11.4%)
Age 25 - 34	7.3%	(5.8% , 9.1%)	10.5%	(9.0% , 12.1%)	8.8%	(7.7% , 10.0%)
Age 35 - 44	5.4%	(4.3% , 6.8%)	10.0%	(8.7% , 11.5%)	7.7%	(6.8% , 8.7%)
Age 45 - 54	5.0%	(3.9% , 6.5%)	11.4%	(10.0% , 13.0%)	8.2%	(7.3% , 9.3%)
Age 55 - 64	6.5%	(5.1% , 8.2%)	13.0%	(10.9% , 15.3%)	9.8%	(8.5% , 11.2%)
Age 65 - 74	5.9%	(4.2% , 8.3%)	10.1%	(8.0% , 12.6%)	8.2%	(6.8% , 9.9%)
Age 75+	8.4%	(6.1% , 11.4%)	7.3%	(5.7% , 9.2%)	7.7%	(6.3% , 9.3%)
Total	6.2%	(5.6% , 6.9%)	10.8%	(10.1% , 11.5%)	8.5%	(8.1% , 9.0%)

Source: 2001-2003 combined Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Figure 29: Trends for Washington State asthma hospitalizations by age group

rate per 100,000	Age 0-4	Age 5-14	Age 15-34	Age 35-64	Age 65+
1990	308.9	96.2	53.2	91.7	194.8
1991	292.3	99.4	54.3	87.5	186.1
1992	339.1	97.8	50.1	78.6	158.5
1993	356.6	135.5	57.9	85.0	170.8
1994	261.6	82.7	49.9	71.9	132.2
1995	319.1	112.6	55.9	78.7	139.6
1996	302.4	101.3	55.0	73.2	126.8
1997	361.1	114.7	54.5	71.4	110.3
1998	295.8	95.8	47.7	65.4	106.1
1999	294.7	90.8	45.8	73.1	125.8
2000	369.3	102.2	42.1	67.0	110.9
2001	328.2	85.2	40.0	69.2	128.2
2002	341.7	98.8	39.9	71.9	136.4

Source: Washington State Comprehensive Hospital Abstract Reporting System (CHARS). Asthma as principal diagnoses.

Figure 30: Age and gender-specific Washington State hospitalization rates

Age Group	Asthma Men		Asthma Women		Asthma Combined	
	%	95% CI	%	95% CI	%	95% CI
<1	495.4	(456.4 , 536.8)	197.7	(172.8 , 225.2)	350.4	(326.9 , 375.2)
1-4	420.1	(402.2 , 438.7)	260.4	(245.9 , 275.4)	342.2	(330.6 , 354.1)
5-14	110.3	(104.7 , 116.1)	80.0	(75.1 , 85.1)	95.5	(91.8 , 99.4)
15-24	24.4	(21.8 , 27.2)	50.2	(46.3 , 54.3)	36.9	(34.6 , 39.4)
25-34	22.8	(20.3 , 25.6)	67.6	(63.1 , 72.4)	44.7	(42.1 , 47.4)
35-44	27.8	(25.2 , 30.6)	94.7	(89.8 , 99.9)	61.1	(58.2 , 64.0)
45-54	31.8	(28.8 , 35.0)	109.3	(103.7 , 115.1)	70.8	(67.6 , 74.1)
55-64	42.3	(37.9 , 47.2)	124.4	(116.7 , 132.5)	83.7	(79.2 , 88.4)
65-74	64.9	(57.8 , 72.5)	143.1	(133.2 , 153.6)	106.5	(100.3 , 113.1)
75-84	100.5	(89.4 , 112.5)	175.7	(163.4 , 188.7)	144.9	(136.3 , 154.0)
85+	109.0	(87.7 , 134.0)	171.5	(152.9 , 191.8)	151.9	(137.3 , 167.5)

Source: Washington State Comprehensive Hospital Abstract Reporting System (CHARS), 2000-2002 combined.
Asthma as principal diagnosis.

Figure 31: Trends for Washington asthma deaths by gender

Year	Males		Females	
		95% CI		95% CI
1980	1.8		1.8	
1981	1.9		1.4	
1982	1.8		2.3	
1983	1.9		1.7	
1984	2.1		1.8	
1985	1.3		2.2	
1986	1.6		2.2	
1987	1.8		2.6	
1988	1.4		2.5	
1989	1.5		2.5	
1990	2.1	(1.4 , 2.9)	2.8	(2.1 , 3.5)
1991	2.0	(1.4 , 2.8)	2.4	(1.8 , 3.1)
1992	2.0	(1.4 , 2.9)	2.9	(2.3 , 3.7)
1993	1.8	(1.2 , 2.5)	2.1	(1.6 , 2.8)
1994	2.1	(1.5 , 2.9)	2.4	(1.9 , 3.1)
1995	2.4	(1.7 , 3.2)	2.3	(1.7 , 2.9)
1996	1.9	(1.4 , 2.7)	2.4	(1.8 , 3.0)
1997	1.8	(1.2 , 2.5)	1.9	(1.4 , 2.4)
1998	1.2	(0.8 , 1.7)	1.6	(1.2 , 2.1)
1999	1.5	(1.0 , 2.1)	1.7	(1.2 , 2.2)
2000	1.1	(0.7 , 1.7)	1.8	(1.4 , 2.4)
2001	1.2	(0.8 , 1.8)	1.7	(1.3 , 2.3)
2002	1.0	(0.6 , 1.5)	2.1	(1.6 , 2.7)

Source: 1980-2002 National Death Certificates, Washington State Death Certificates
Asthma as primary cause of death, age-adjusted to 2000 US Population.

Figure 32: Washington State asthma death rates by age group

rate per 100,000		
		95% CI
0-4 years	0.1	(0.01 , 0.20)
5-14 years	0.3	(0.10 , 0.30)
15-34 year	0.3	(0.30 , 0.50)
35-64 year	1.1	(1.11 , 1.41)
65+ years	7.8	(8.46 , 9.95)

Source: 1998-2002 combined National Death Certificates, Washington State Death Certificates
Asthma as primary cause of death.

Figure 33: Asthma prevalence by income category, among Washington adults

	%	95% CI
<\$20,000 per year	12.2%	(10.8% , 13.6%)
\$20,000 to \$49,000	9.1%	(8.3% , 10.0%)
\$50,000 or more	6.7%	(6.1% , 7.4%)

Source: 2001-2003 combined Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 34: Prevalence of inability to work by asthma status, among Washington adults

	%	95% CI
Non-Asthmatics	3.3%	(3.0% , 3.6%)
Adults with Asthma	9.1%	(7.7% , 10.7%)

Source: 2001-2003 combined Washington State Behavioral Risk Factor Surveillance System (BRFSS). Ages 65 or older are excluded.

Figure 35: Prevalence of asthma by educational attainment, among Washington adults

	%	95% CI
Some High School	11.1%	(9.2% , 13.4%)
High School Grad/ GED	8.8%	(7.9% , 9.9%)
Some College	8.1%	(7.6% , 8.7%)
College Grad	8.5%	(8.1% , 9.0%)

Source: 2001-2003 combined Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 36: Prevalence of asthma by race/ethnicity, among Washington adults

	%	95% CI
White	8.6%	(8.1% , 9.1%)
Black	11.1%	(7.2% , 16.8%)
Asian	5.2%	(3.3% , 8.3%)
Pacific Islander	6.6%	(3.8% , 11.2%)
Native American	12.7%	(9.1% , 17.5%)
Hispanic (any race)	6.2%	(4.8% , 7.9%)
English-speaking Hispanic	7.1%	(5.4% , 9.3%)
Spanish-speaking Hispanic	2.5%	(1.4% , 4.2%)

Source: 2001-2003 combined Washington State Behavioral Risk Factor Surveillance System (BRFSS). Hispanic ethnicity collected separately from race.

Figure 37: Prevalence of asthma by race/ethnicity, among Washington youth

	%	95% CI
White	9.2%	(8.7% , 9.6%)
Black	10.6%	(8.7% , 12.4%)
Asian	5.9%	(4.7% , 7.2%)
Pacific Islander	8.0%	(5.3% , 10.8%)
Native American	9.8%	(7.5% , 12.0%)
Hispanic	5.8%	(4.4% , 7.2%)

Source: combined 2002 and 2004 Washington State Healthy Youth Survey (HYS), 6-8-10-12th grade-standardized. Race and Hispanic ethnicity collected as part of a single question.

Figure 38: Washington death rates from asthma by race/ethnicity

rate per 100,000		
		95% CI
Total	1.9	(1.76 , 2.00)
White	1.8	(1.67 , 1.92)
Black	3.6	(2.51 , 5.04)
Native American	3.1	(1.43 , 5.92)
Asian/ Pacific Islander	2.6	(1.87 , 3.61)
Hispanic Ethnicity	1.3	(0.66 , 2.56)

Source: 1992-2001 combined Washington State Death Certificates Asthma as primary cause of death, age-adjusted to 2000 US Population

Figure 39: Asthma prevalence by sexual orientation within gender groups, among Washington adults

	Total		Men only		Women only	
	%	95% CI	%	95% CI	%	95% CI
Heterosexual/ Straight	9.0%	(8.4% , 9.5%)	6.8%	(6.1% , 7.7%)	11.1%	(10.3% , 11.8%)
Lesbian, Gay, or Bisexual	14.3%	(10.8% , 18.7%)	5.1%	(2.7% , 9.3%)	23.0%	(17.1% , 30.2%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 40: Asthma prevalence by county, among Washington adults, 2001-03 combined

	%	95% CI
State Total	9.1%	(8.6% , 9.6%)
Adams	7.0%	(2.4% , 18.9%)
Asotin	11.7%	(5.8% , 22.1%)
Benton	7.8%	(5.7% , 10.7%)
Chelan	8.3%	(5.2% , 13.0%)
Clallam	7.3%	(4.5% , 11.6%)
Clark	8.8%	(6.9% , 11.1%)
Columbia	24.0%	(4.6% , 67.1%)
Cowlitz	9.2%	(6.2% , 13.3%)
Douglas	4.6%	(2.2% , 9.4%)
Ferry	8.2%	(3.1% , 20.1%)
Franklin	5.6%	(3.3% , 9.5%)
Garfield	25.9%	(7.5% , 60.3%)
Grant	5.4%	(3.1% , 9.2%)
Grays Harbor	11.2%	(7.5% , 16.4%)
Island	8.9%	(5.6% , 13.7%)
Jefferson	10.0%	(4.7% , 20.0%)
King	8.3%	(7.4% , 9.3%)
Kitsap	9.2%	(7.2% , 11.6%)
Kittitas	4.7%	(2.6% , 8.3%)
Klickitat	10.5%	(4.9% , 21.1%)
Lewis	7.5%	(4.6% , 12.0%)
Lincoln	4.0%	(2.4% , 6.8%)
Mason	12.2%	(7.1% , 20.2%)
Okanogan	10.5%	(5.6% , 18.9%)
Pacific	7.8%	(3.8% , 15.5%)
Pend Oreille	16.6%	(6.1% , 37.9%)
Pierce	8.4%	(7.0% , 10.1%)
San Juan	9.6%	(2.8% , 27.6%)
Skagit	6.1%	(4.0% , 9.3%)
Skamania	4.5%	(2.0% , 9.6%)
Snohomish	8.5%	(7.1% , 10.2%)
Spokane	9.9%	(8.2% , 11.9%)
Stevens	15.0%	(8.2% , 25.8%)
Thurston	8.2%	(6.4% , 10.5%)
Wahkiakum	2.4%	(1.2% , 4.6%)
Walla Walla	12.8%	(8.3% , 19.2%)
Whatcom	7.8%	(5.6% , 10.7%)
Whitman	7.8%	(4.8% , 12.4%)
Yakima	6.5%	(4.8% , 8.6%)

Source: 2001-2003 combined Washington State Behavioral Risk Factor Surveillance System (counties); statewide data from 2003 only.

Figure 41: Hospitalization rates by county for Washington State, 2000-02 combined

Rate = Hospitalizations per 100,000 Age-adjusted to Year 2000 US population		
Place	Rate	95% CI
State Total	91.5	(90.1 , 92.9)
Adams	97.6	(72.0 , 130.1)
Asotin	15.2	(6.9 , 29.4)
Benton	87.3	(78.7 , 96.7)
Chelan	77.4	(65.7 , 90.6)
Clallam	129.8	(113.4 , 148.1)
Clark	58.8	(54.1 , 63.8)
Columbia	161.0	(95.1 , 260.7)
Cowlitz	112.8	(100.7 , 126.0)
Douglas	94.3	(76.2 , 115.6)
Ferry	133.5	(86.6 , 199.6)
Franklin	106.4	(89.3 , 126.4)
Garfield	17.1	(1.9 , 109.4)
Grant	86.4	(74.8 , 99.4)
Grays Harbor	102.8	(89.1 , 118.0)
Island	53.0	(43.8 , 63.6)
Jefferson	100.9	(77.6 , 129.9)
King	107.5	(104.6 , 110.5)
Kitsap	79.8	(73.2 , 86.9)
Kittitas	44.5	(31.6 , 61.3)
Klickitat	69.2	(49.1 , 95.4)
Lewis	65.0	(54.6 , 77.0)
Lincoln	111.9	(78.2 , 158.2)
Mason	82.4	(68.1 , 99.1)
Okanogan	53.4	(40.9 , 68.7)
Pacific	78.1	(56.9 , 105.9)
Pend Oreille	144.3	(106.5 , 193.5)
Pierce	98.2	(94.0 , 102.6)
San Juan	41.8	(22.6 , 72.9)
Skagit	66.7	(58.0 , 76.5)
Skamania	57.9	(32.7 , 96.0)
Snohomish	73.0	(69.1 , 77.0)
Spokane	99.3	(93.9 , 105.1)
Stevens	110.9	(92.2 , 132.6)
Thurston	88.6	(81.3 , 96.5)
Wahkiakum	133.2	(73.8 , 230.1)
Walla Walla	62.7	(50.9 , 76.4)
Whatcom	90.2	(81.9 , 99.2)
Whitman	91.8	(73.4 , 113.6)
Yakima	121.6	(113.5 , 130.2)

Source: 2000-02 combined Washington State hospitalization records (CHARS)

Figure 42: Prevalence of asthma by community type, among Washington adults and youth

Adults with Asthma			Youth with Asthma		
	%	95% CI	%	95% CI	
Urban	8.5%	(7.9% , 9.1%)	8.2%	(7.7% , 8.7%)	
Suburban	8.7%	(7.4% , 10.1%)	8.1%	(7.3% , 8.9%)	
Large Town	8.7%	(7.3% , 10.2%)	8.7%	(7.6% , 9.9%)	
Rural	9.2%	(7.1% , 11.9%)	7.1%	(6.1% , 8.2%)	

Source: 2001-2003 combined Washington State Behavioral Risk Factor Surveillance System (BRFSS); 2002 and 2004 combined Washington State Healthy Youth Survey (HYS)

Figure 43: Washington asthma hospitalization rates by community type
rate per 100,000

		95% CI
Urban Core Areas	100.9	(97.8 , 104.1)
Suburban Areas	83.7	(77.4 , 90.4)
Large Town Areas	89.6	(81.8 , 98.0)
Small Town & Isolated Rural Areas	81.9	(73.6 , 91.0)

Source: Washington State Comprehensive Hospital Abstract Reporting System (CHARS), 2002. Asthma as principal diagnosis, rate per 100,000. RUCA assigned by patient zipcode. Age-adjusted to year 2000 standard US population.

Figure 44: Asthma prevalence by cigarette smoking status, among Washington adults

	%	95% CI
Current Smoker	9.5%	(8.5% , 10.7%)
Former Smoker	9.0%	(8.1% , 9.9%)
Never Smoker	7.9%	(7.3% , 8.6%)

Source: 2001-03 combined Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 45: Asthma Prevalence by cigarette smoking status, among Washington youth

Smokers			Non-Smokers		
	%	95% CI	%	95% CI	
6th grade	11.2%	(8.1% , 15.1%)	6.9%	(6.4% , 7.4%)	
8th grade	13.0%	(10.7% , 15.8%)	8.4%	(7.8% , 9.1%)	
10th grade	11.0%	(9.1% , 13.2%)	9.6%	(8.7% , 10.5%)	
12th grade	10.5%	(8.7% , 12.7%)	8.7%	(7.9% , 9.7%)	

Source: 2002 and 2004 combined, Washington State Healthy Youth Survey (HYS)

Figure 46: Asthma prevalence by bodyweight and gender, among Washington adults

Asthma: Men			Asthma: Women			Asthma: Total		
	%	95% CI	%	95% CI		%	95% CI	
Not Overweight	5.5%	(4.6% , 6.5%)	8.6%	(7.6% , 9.6%)		7.3%	(6.6% , 8.1%)	
At Risk for Overweight	5.5%	(4.7% , 6.5%)	10.3%	(9.1% , 11.7%)		7.3%	(6.6% , 8.1%)	
Obese	8.6%	(7.0% , 10.4%)	17.1%	(15.4% , 18.9%)		12.7%	(11.5% , 14.0%)	

Source: 2001--03 combined Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 47: Asthma prevalence by bodyweight and gender, among Washington youth

Asthma: Boys			Asthma: Girls	
	%	95% CI	%	95% CI
Not Overweight	7.2%	(6.7% , 7.9%)	10.4%	(9.7% , 11.1%)
At Risk for Overweight	7.7%	(6.2% , 9.4%)	12.9%	(10.4% , 15.6%)
Obese	10.0%	(8.2% , 11.7%)	13.2%	(10.5% , 16.7%)

Source: 2002 and 2004 combined Washington State Healthy Youth Survey (HYS), grade-standardized for 8-10-12th grade respondents.

Figure 48: Asthma prevalence by past-month inhaled substance use frequency, among Washington youth (8th grade)

	%	95% CI
No Inhalant Use	8.0%	(7.0% , 9.2%)
Inhalants 1-2 days	19.1%	(12.8% , 27.5%)
Inhalants 3+ days	27.0%	(17.7% , 38.8%)
No Marijuana	8.4%	(7.7% , 9.1%)
Marijuana 1-2 days	10.0%	(7.6% , 13.1%)
Marijuana 3+ days	13.8%	(10.5% , 17.9%)

Source: 2002 Washington State Healthy Youth Survey (HYS) for inhalants; 2002 and 2004 HYS combined for marijuana, 8th grade only.

Figure 49: Distribution of asthma symptom severity among Washington adults with current asthma

	%	95% CI
Mild Intermittent	56.2%	(50.2% , 62.0%)
Mild Persistent	16.1%	(12.1% , 21.1%)
Moderate Persistent	14.5%	(10.9% , 19.0%)
Severe Persistent	13.3%	(9.7% , 17.9%)

Source: 2001 Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Figure 50: Distribution of asthma symptom severity among Washington youth with current asthma

	%	95% CI
Mild Intermittent	65.8%	(61.3% , 70.0%)
Mild Persistent	16.2%	(13.6% , 19.3%)
Moderate Persistent	11.8%	(9.4% , 14.7%)
Severe Persistent	6.2%	(4.6% , 8.4%)

Source: 2004 Washington State Healthy Youth Survey (HYS), combined results for 8th-10th-12th grade students

Figure 51: Prevalence of asthma symptoms by lifetime asthma status among Washington youth

	Never diagnosed with asthma		Youth ever diagnosed with asthma	
	%	95% CI	%	95% CI
Not at any time	75.9%	(74.7% , 77.1%)	18.3%	(15.8% , 21.2%)
Less than once a week	9.5%	(8.8% , 10.3%)	25.5%	(21.7% , 29.7%)
Once or twice a week	4.4%	(4.0% , 4.9%)	18.3%	(15.6% , 21.5%)
More than 2 times a week, not every day	2.8%	(2.4% , 3.2%)	15.3%	(12.5% , 18.7%)
Every day, but not all of time	1.3%	(1.1% , 1.6%)	11.5%	(9.2% , 14.3%)
Every day, all the time	0.6%	(0.5% , 0.8%)	3.4%	(2.1% , 5.3%)
I don't know	5.5%	(4.9% , 6.1%)	7.7%	(5.5% , 10.6%)
Anytime	24.1%	(22.9% , 25.3%)	81.7%	(79.1% , 84.6%)

Source: 2004 Washington State Healthy Youth Survey (HYS), combined results for 8th-10th-12th grade students

Figure 52: Prevalence of severe persistent symptom severity by age and gender among Washington adults with asthma

	%	95% CI
Male	21.1%	(13.1% , 32.2%)
Female	9.6%	(6.5% , 13.9%)
18-34	9.2%	(4.7% , 17.3%)
35-64	12.3%	(8.2% , 18.0%)
65+	25.8%	(13.6% , 43.6%)

Source: 2001 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 53: Prevalence of not having a personal doctor by asthma status, among Washington adults

One or more personal doctor		Have healthcare coverage		
	%	95% CI	%	95% CI
Non-Asthmatics	78.4%	(77.6% , 79.3%)	85.5%	(84.8% , 86.3%)
Adults With Asthma	85.1%	(82.5% , 87.3%)	86.6%	(84.3% , 88.6%)
Total	79.0%	(78.2% , 79.8%)	85.6%	(84.9% , 86.3%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Figure 54: Prevalence of unmet healthcare needs by asthma status, among Washington adults

	%	95% CI
Non-Asthmatics	12.6%	(11.9% , 13.3%)
Adults With Asthma	16.6%	(14.5% , 18.8%)
Total	12.9%	(12.3% , 13.6%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 55: Prevalence of past-year routine healthcare visit (any reason) by asthma status, among Washington adults

	%	95% CI
Non-Asthmatics	75.2%	(74.1% , 76.4%)
Adults With Asthma	82.8%	(79.7% , 85.5%)
Total	75.9%	(74.9% , 77.0%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 56: Prevalence of past-year routine healthcare visit (any reason) by grade or gender and asthma status, among Washington youth

no asthma			asthma	
	%	95% CI	%	95% CI
8th grade	59.4%	(57.8% , 61.0%)	67.6%	(63.4% , 71.6%)
10th grade	61.7%	(59.2% , 64.1%)	70.7%	(67.3% , 74.0%)
12th grade	59.3%	(57.4% , 61.2%)	68.4%	(64.3% , 72.9%)
Boys	57.6%	(56.1% , 59.2%)	67.0%	(62.8% , 71.1%)
Girls	61.3%	(59.9% , 71.1%)	69.1%	(66.1% , 72.1%)

Source: 2002 and 2004 combined Washington State Healthy Youth Survey (HYS), grade-standardized for boy/girl estimates.

Figure 57: Distribution of past-year routine asthma healthcare visits among Washington adults with asthma

	%	95% CI
None	53.3%	(47.1% , 59.4%)
Once	29.9%	(24.6% , 35.8%)
2-3 times	7.8%	(5.2% , 11.6%)
4-5 times	2.2%	(1.1% , 4.4%)
6+ times	6.7%	(4.2% , 10.7%)

Source: 2001 Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Figure 58: Distribution of past-year routine asthma healthcare visits by gender, among Washington youth with asthma

	%	95% CI
female	59.8%	(55.6% , 63.8%)
male	46.6%	(40.8% , 52.6%)
total	55.0%	(51.4% , 58.5%)

Source: 2004 Washington State Healthy Youth Survey (HYS), combined results for 8th-10th-12th grade students.

Figure 59: Prevalence of ever having a written "asthma plan," among Washington youth with asthma

	%	95% CI
Yes	34.6%	(30.4% , 39.1%)
No	41.6%	(37.4% , 45.9%)
Don't know	23.8%	(20.2% , 27.8%)

Source: 2004 Washington State Healthy Youth Survey (HYS), combined results for 8th-10th-12th grade students.

Figure 60: Distribution of asthma medication use frequency during past month, among Washington adults with asthma

	%	95% CI
No days	26.6%	(21.5% , 32.4%)
Less than weekly	14.0%	(10.1% , 19.2%)
Weekly, but not daily	7.4%	(4.6% , 11.7%)
Between 2-6 days per week	8.3%	(5.6% , 12.3%)
Once per day	13.1%	(9.3% , 18.0%)
2+ times per day	30.7%	(25.5% , 36.3%)

Source: 2001 Washington State Behavioral Risk Factor Surveillance System (BRFSS). [Note: Some people who take asthma medication less often than every month may be counted in the "No days" category.]

Figure 61: Prevalence of asthma medication use during past month by symptom severity, among Washington adults with asthma

	%	95% CI
Mild Intermittent	18.1%	(7.4% , 25.5%)
Mild Persistent	91.8%	(87.3% , 100.8%)
Moderate Persistent	97.6%	(95.8% , 104.7%)
Severe Persistent	92.5%	(88.2% , 101.4%)

Source: 2001 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 62: Prevalence of daily preventive asthma medication use during past year, among Washington youth with asthma

	%	95% CI
Yes	63.8%	(59.7% , 67.6%)
No	29.0%	(25.3% , 33.1%)
Don't know	7.2%	(5.4% , 9.6%)

Source: 2004 Washington State Healthy Youth Survey (HYS), combined results for 8th-10th-12th grade students.

Figure 63: Prevalence of receiving advice to quit smoking during the past year by asthma status, among Washington adult smokers

	%	95% CI
Non-Asthmatics	10.6%	(9.5% , 11.8%)
Adults With Asthma	9.6%	(6.7% , 13.5%)
Total	10.5%	(9.5% , 11.7%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS). non-significant difference.

Figure 64: Prevalence of past-year quit attempts by asthma status, among Washington adult smokers

	%	95% CI
Non-Asthmatics	53.9%	(51.6% , 56.2%)
Adults With Asthma	66.6%	(60.4% , 72.3%)
Total	55.2%	(53.0% , 57.3%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 65: Prevalence of receiving preventive flu vaccines during the past year by age and asthma status, among Washington adults

65+ age group			<65 age group		
	%	95% CI	%	95% CI	
Non-Asthmatics	73.1%	(71.3% , 74.8%)	27.7%	(26.8% , 28.7%)	
Adults With Asthma	75.9%	(69.2% , 81.6%)	36.5%	(33.5% , 39.7%)	
Total	73.3%	(71.6% , 75.0%)	28.6%	(27.6% , 29.5%)	

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 66: Prevalence of ever receiving preventive pneumonia vaccine by age and asthma status, among Washington adults

65+ age group			<65 age group		
	%	95% CI	%	95% CI	
Non-Asthmatics	67.5%	(65.6% , 69.4%)	15.3%	(14.5% , 16.2%)	
Adults With Asthma	79.4%	(72.9% , 84.7%)	29.3%	(26.3% , 32.5%)	
Total	68.5%	(66.6% , 70.3%)	16.6%	(15.8% , 17.5%)	

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 67: Prevalence of hypertension by asthma status, among Washington adults

	%	95% CI
Non-Asthmatics	23.0%	(22.2% , 23.8%)
Adults with Asthma	31.4%	(28.8% , 34.2%)
Total	23.8%	(23.0% , 24.5%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 68: Prevalence of diabetes by asthma status, among Washington adults

	%	95% CI
Non-Asthmatics	6.5%	(6.0% , 6.9%)
Adults With Asthma	8.8%	(7.4% , 10.4%)
Total	6.7%	(6.3% , 7.1%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 69: Prevalence of diabetes by asthma status, among Washington youth

	%	95% CI
Non-Asthmatics	3.8%	(3.3% , 4.4%)
Youth with Asthma	5.2%	(3.7% , 7.3%)

Source: 2004 Washington State Healthy Youth Survey (HYS), combined results for 8th-10th-12th grade students.

Figure 70: Prevalence of asthma-related policies and practices, among Washington State secondary schools

	2002		2004	
	Estimate	95% CI	Estimate	95% CI
Provide intensive case management for students with asthma who are absent 10 days or more per year	31%	(31.0% , 31.0%)	37%	(32.0% , 42.0%)
Allow students to self-carry inhalers as prescribed by physician and approved by parents	94%	(94.0% , 94.0%)	94%	(91.0% , 96.0%)
Educate students with asthma about asthma management	48%	(48.0% , 48.0%)	52%	(47.0% , 58.0%)
Obtain and use an asthma action plan for all students with asthma	62%	(62.0% , 62.0%)	76%	(72.0% , 81.0%)
Identify and track all students with asthma	86%	(86.0% , 86.0%)	92%	(90.0% , 95.0%)
Provide a full-time Registered Nurse, all day every day	15%	(15.0% , 15.0%)	16%	(12.0% , 20.0%)
Provide modified physical education and physical activities as indicated by the student's Asthma Action Plan	84%	NA NA	88%	(84.0% , 91.0%)
Educate school staff about asthma	46%	NA NA	54%	(49.0% , 59.0%)
Teach asthma awareness to all students in at least one grade	17%	NA NA	19%	(15.0% , 23.0%)

Source: 2004 Washington State School Health Education Profile (SHEP). [Note: Percentages are of schools, not students.]

Figure 71: Percent students with asthma identified to school nurses, Washington State

	%
Students with asthma known to school nurses	63%
Students with asthma unknown to school nurses	37%

Source: Office of the Superintendent of Public Instruction - School Nurse Corps, 2003-04 School Year and 2004 Healthy Youth Survey

Figure 72: Prevalence of asthma management indicators, among Washington students with asthma who are identified by school nurses

	Class I Districts	Class II Districts	Total	Class I Districts	Class II Districts	Total
	2002-03 School Year			2003-04 School Year		
Total Students	613,413	115,496	728,909	557,545	112,621	670,166
% Life-Threatening Asthma (among identified students with asthma)	10%	21%	12%	8%	24%	11%
% Emergency Care Plans (ECP) in Place (among identified students with asthma)	13%	34%	15%	13%	42%	18%
Health Care Plans (HCP) in Place (among identified students with asthma)	7%	12%	8%	10%	8%	9%

Source: Office of the Superintendent of Public Instruction - School Nurse Corps, 2003-04 School Year

Figure 73: Prevalence of symptoms/discomfort as a result of air quality, among Washington adults

	%	95% CI
Outdoor air	19.5%	(18.1% , 21.0%)
Indoor air	15.8%	(14.5% , 17.2%)

Source: Washington State BRFSS 1996

Figure 74: Prevalence of belief about contributors to outdoor air pollution, among Washington adults

	%	95% CI
Transportation	43.1%	(41.3% , 45.0%)
Industry	21.9%	(20.4% , 23.5%)
Trash or garbage burning	12.7%	(11.5% , 13.9%)
Woodstoves	33.8%	(32.1% , 35.6%)
Agricultural dust	17.8%	(16.3% , 19.3%)
Dust/smoke from landclearing	19.0%	(17.6% , 20.5%)

Source: Washington State Behavioral Risk Factor Surveillance System (BRFSS) 1996

Figures 75-78 were obtained from previously published reports and original data were not available for inclusion as tables.

Figure 79: Prevalence of risk factors for poor indoor air quality, among Northwest schools

Inadequate ventilation equipment	
*No mechanical ventilation system (portable buildings only)	10.0%
*Mechanical ventilation system turned off (portables only)	25.5%
Faulty exhaust fans	67.3%
Failed shop exhaust fans	23.1%
Sources of Irritants	
Water-stained ceiling tiles	54.5%
One or more classrooms with animals	46.2%
Carpet in classroom	84.0%
Carpet in hallways	50.6%
Wood or metal shop	25.0%
Combustion equipment	84.6%
Preventive Measures	
Carbon monoxide detector/alarm with combustion equipment	5.3%
Photocopiers vented to outdoors	9.7%
Laminators vented to outdoors	6.4%
Custodial chemical metering system	66.0%

Source: Washington and Idaho schools included in Prill et al. [Note: Measures marked * are of portable classrooms; remaining percentages are for school buildings, not classrooms.]

Figure 80: Prevalence of poor indoor air quality, among Northwest schools

Poor Air Ventilation	
**Total classrooms with CO2 > 1,000 ppm	42.5%
*Portable classrooms with CO2 > 1,000 ppm	66.0%
Buildings with any classrooms having CO2 > 2,000 ppm	36.5%
Buildings with any classrooms having CO2 > 3,000 ppm	6.4%
Buildings with any classrooms having CO2 > 4,000 ppm	2.5%
Good Ventilation	
Buildings having NO classrooms with CO2 > 1,000 ppm	12.2%

Source: Washington and Idaho schools included in Prill et al. [Note: Measures marked * are for portable classrooms and ** are of total classrooms; remaining percentages are for buildings.]

Figure 81: Trends in work compensation claims for asthma, Washington State

rate= claims per 100,000 FTE-YR			
	Rate of Filed Claims	Rate of Accepted Claims	Rate of Compensable Claims
1995	7.92	5.02	2.35
1996	10.09	6.67	3.18
1997	7.80	4.37	1.97
1998	7.96	5.14	2.75
1999	8.65	5.77	2.68
2000	10.22	5.31	1.28
2001	12.44	7.32	1.85
2002	12.89	6.62	1.67

Source: Labor & Industries Worker Compensation Claims Data. Curwick, et al. Error! Bookmark not defined.

Figure 82: Prevalence of rules allowing indoor smoking by worksite type, among large Washington worksites

	Yes	95% CI
Office	2.1%	(1.2% , 3.9%)
Store	7.0%	(4.5% , 10.9%)
Warehouse	10.9%	(7.5% , 15.5%)
Restaurant	42.5%	(33.3% , 52.4%)
Bar/Lounge	100.0%	NA NA
Casino	100.0%	NA NA
School	0.0%	NA NA
Hospital	0.0%	NA NA
Healthcare	0.0%	NA NA
Nursing	3.1%	(0.8% , 11.5%)
Other	18.4%	(11.4% , 28.3%)
Total	9.8%	(8.3% , 11.5%)

Source: 2004 Washington State Worksite Policy Survey, employers with 50+ employees only.

Figure 83: Prevalence of exposure to secondhand smoke (SHS) at work by asthma status, among Washington adult non-smokers

	%	95% CI
Non-Asthmatics	14.2%	(12.9% , 15.6%)
Adults with Asthma	15.3%	(11.2% , 20.6%)
Total	14.3%	(13.1% , 15.6%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS).

Figure 84: Baseline prevalence of home triggers for asthma, among Seattle-King County asthma study participants

	%	95% CI
Smoker in house	40.9%	(35.0% , 46.7%)
Observed indoor mold	43.5%	(37.3% , 49.7%)
Water damage in the house	21.1%	(16.0% , 26.3%)
No working bathroom fan	27.6%	(21.9% , 33.3%)
Carpet in bedroom	77.9%	(72.6% , 83.1%)
Have pets	23.6%	(18.5% , 28.7%)
Observed or reported having cockroaches	17.6%	(13.0% , 22.1%)

Source: Seattle-King County Healthy Homes Project (Krieger et al. 2005)

Figure 85: Prevalence of heat sources in home (primary or available sources), among Washington adults

Primary heat source			Present as heat source	
	%	95% CI	%	95% CI
electric	48.2%	(46.3% , 50.0%)	61.2%	(59.4% , 63.0%)
gas	30.1%	(28.4% , 31.8%)	31.2%	(29.5% , 32.9%)
oil	7.0%	(6.0% , 8.0%)	7.5%	(6.6% , 8.6%)
propane	1.7%	(1.3% , 2.2%)	2.2%	(1.8% , 2.8%)
woodstove	9.6%	(8.5% , 10.8%)	27.9%	(26.2% , 29.6%)
fireplace	1.5%	(1.1% , 2.0%)	11.7%	(10.6% , 13.0%)

Source: 1996 BRFSS

Figure 86: Prevalence of asthma by exposure to secondhand smoke (SHS) at home, among non-smoking Washington youth

	Not Exposed		Exposed Weekly	
	%	95% CI	%	95% CI
6th grade	6.1%	(5.6% , 6.7%)	8.7%	(7.8% , 9.7%)
8th grade	7.5%	(6.7% , 8.4%)	9.6%	(8.5% , 10.9%)
10th grade	8.3%	(7.3% , 8.4%)	11.3%	(10.0% , 12.7%)
12th grade	8.6%	(7.3% , 10.1%)	9.3%	(7.9% , 10.9%)

Source: 2002 and 2004 combined Washington State Healthy Youth Survey (HYS).

Figure 87: Prevalence of asthma by exposure to secondhand smoke (SHS) at home, among non-smoking Washington adults

	%	95% CI
No smoking in home	9.0%	(8.3% , 9.8%)
Smoking allowed in home	11.5%	(8.4% , 15.5%)

Source: 2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS)

Appendix C: Technical Notes

Confidence Intervals

Confidence intervals (CI) are used to account for the difference between a sample from a population and the population itself. They can also be used to account for uncertainty that arises from natural variation inherent in the world around us. As such, they provide a means of assessing and reporting the precision of a point estimate, such as a mortality or hospitalization rate or the frequency of reported behaviors. Confidence intervals do not account for several other sources of uncertainty, including missing or incomplete data, bias resulting from non-response to a survey, or poor data collection. In this report, we have used confidence levels of 95%. This level means that in 95 out of 100 cases, the confidence interval contains the true value. These confidence intervals were generally calculated by multiplying the standard error by 1.96, adding and subtracting the product to and from the point estimate to obtain the upper and lower bounds of the confidence intervals. Because of the nature of the sampling for BRFSS and the Healthy Youth Survey, standard errors for rates or frequencies using these data sources were generated using STATA software, to account for complex sampling designs.

Confidence intervals are presented in Appendix B tables, generally adjacent to point estimates as “(lower bound, upper bound).”

Confidence intervals in this publication are also presented graphically. The confidence intervals are shown by the vertical lines, with the upper and lower bounds shown by horizontal lines at each end of the intervals, also referred to as error bars.

Statistically Significant Differences

Statistically significant differences – differences between estimates that are not likely due to chance alone – are identified in this report in a variety of ways.

Some significant differences can be identified by visually comparing confidence intervals in graphs or comparing the bounds reported in Appendix B tables. When comparing two percentages, if the 95% CI of a percentage overlaps the point estimate for the other percentage, the two percentages are NOT statistically significantly different. If the confidence intervals do not overlap, the percentages ARE significantly different.

If the confidence intervals overlap with each other, but not with the point estimates, the two percentages may or may not be significantly different, in which case, formal statistical testing for significance was needed to produce a p-value. P-values less than 0.05 indicate that both percentages are statistically significant at the 95% confidence level.

In this report, we used the following tests to produce p-values:

- Chi-square tests were done for simple tests of association exposure and outcome variables when both exposure and outcome were binary (for example, asthma [yes, no] and gender [male, female])

- Logistic regression models were used for binary outcome variables when exposure variables were not binary or where additional variables were included in a statistical model (in this case an odds ratio is reported as well)
- Linear regression models were used for continuous outcome variables, including ordinal categorical variables (for example, symptom frequency during the past month where reported days were combined into frequency categories).

Multivariate Models and Odds Ratios

When an outcome of interest (for example asthma) was associated with an exposure (for example age), and both outcome and exposure were associated with another factor (such as smoking), multivariate logistic models were used to control for the effects of the other factor in order to reveal the association of interest. In this example a multivariate model would reveal the association between asthma and age independent of the effect of smoking. When multivariate models were used a simplified description of the analysis was included as a footnote in the body of the report, expressed as an odds ratio.

An odds ratio (OR) is a comparison of the presence of a risk factor among groups with the disease (or outcome of interest) and those without the disease. This value is calculated as the number of people with disease who were exposed to a risk factor (I_e) over those with disease who were not exposed (I_o) divided by those without disease who were exposed (N_e) over those without who were not exposed (N_o). Thus $OR = (I_e/I_o)/(N_e/N_o) = I_e N_o / I_o N_e$.

Age-Adjusted Rates

Sometimes population characteristics need to be considered when comparing the health status of two groups of people, such as Washington residents and those of the US. Because many health indicators change with age, age is one of the most important characteristics to consider. We usually want to know whether our rate of disease or risk factors is higher or lower than a comparison group independent of the fact that we are older or younger than the comparison group.

Age-adjustment is a method of developing rates that eliminate the impact of different age structures in two populations. Age-adjustment also allows us to compare rates in the same population over a period of time during which the population may have aged. Age-adjusted rates were computed by multiplying the rate for a specific age group in a given population by the proportion of people in the same age group in a standard population and then adding across age groups.

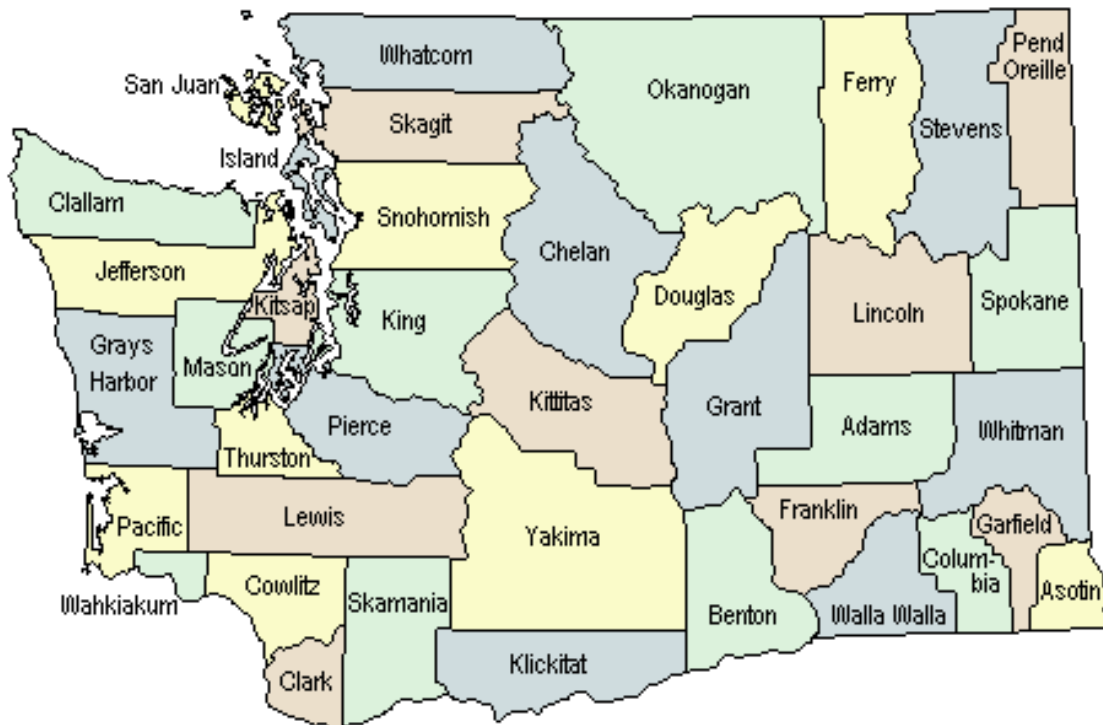
Unless otherwise indicated, all age-adjusted rates in this document have been adjusted to the 2000 US standard population.

In a few cases a combined estimate for grade 6-8-10-12 from the Healthy Youth Survey was “grade-adjusted.” This was done in cases where it was desirable to have a single

estimate for all four grades combined, and the concept is equivalent to adjusting to a standard population: in this case a population with equal proportions of youth in each represented grade.

Washington State Geographic estimates

County-level data for asthma hospitalizations, adult prevalence, and population estimates for the number of adults and youth with asthma are presented in this report. The map of Washington State below identifies counties by name and may be used to assist interpretation of hospitalization and adult prevalence maps (Figures 40 and 41).



The maps in this report compare county rates or frequencies to the state average. Counties in darker shades have rates or frequencies above the state average, and those in lighter shades are below the state average. It should be noted that nearly all these differences from the state rate are not statistically significant, but only absolute differences in point estimates.

County-level hospitalization data are unreliable for counties where a large proportion of the population uses military hospitals or hospitals in Idaho or Oregon. Island County has a large proportion of people using military hospitals; Asotin and Garfield have large population proportions using hospitals in Idaho. Data on Washington residents hospitalized in Oregon were combined through 2002 with Washington hospitalization data, maps do not include county rates for Clark, Cowlitz, Klickitat, Pacific, Skamania, and Wahkiakum counties.

Designation of Urban-Rural Community Type

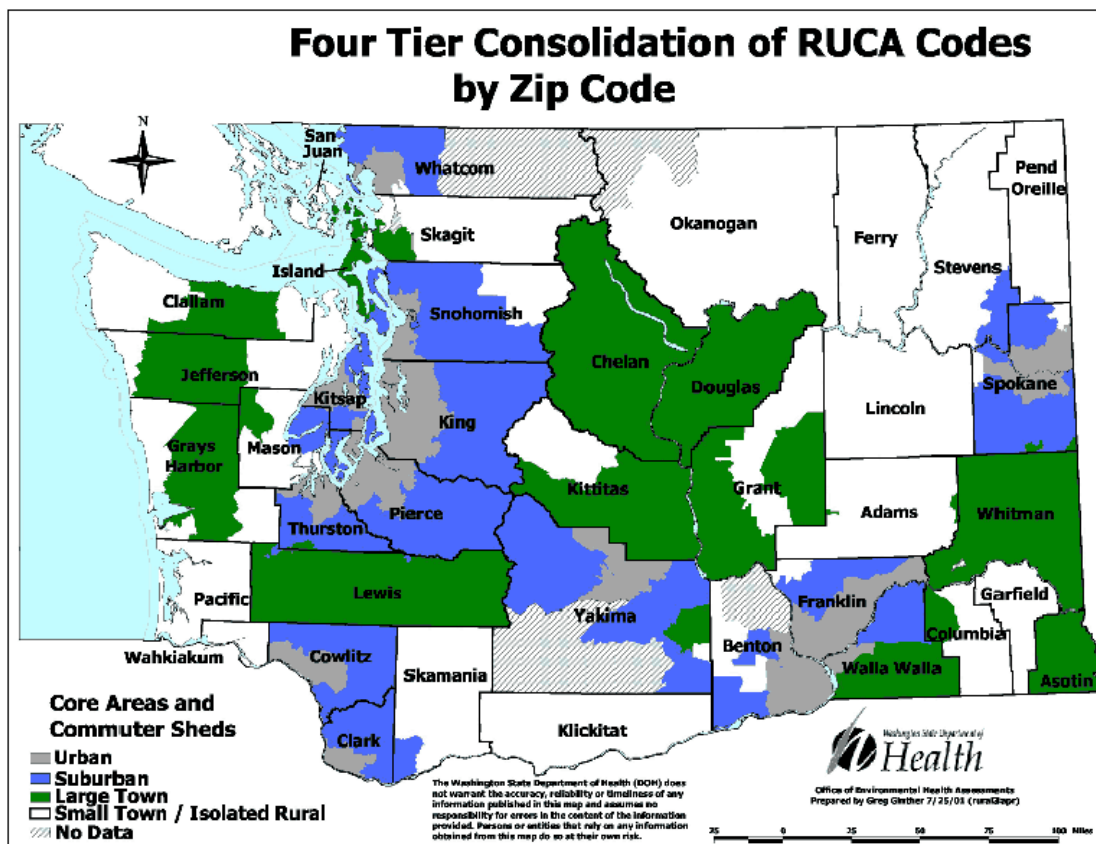
Analyses of data stratified by community type were conducted using methods of the recent Washington State Department of Health (DOH) Health of Washington State report:

(<http://www.doh.wa.gov/Data/Guidelines/RuralUrban.htm>).

The community types are classified as follows:

- Urban Core Areas - continuously built up areas of 50,000 persons or more. These areas correspond to US Bureau of the Census defined Urbanized Areas.
- Suburban Areas - areas with high commuting relationships with Urban Core Areas. Suburban areas include Large Town, Small Town and Isolated Rural Areas with high commuting levels to Urban Core Areas.
- Large Town Areas - towns with populations between 10,000 and 49,999 and surrounding rural areas with high commuting levels to these towns.
- Small Town and Isolated Rural Areas - towns with populations below 10,000 and their commuter sheds and other isolated rural areas.

Individuals were assigned to one of four Rural Urban Commuting Area (RUCA) categories by zipcode of residence for adults and by location of the school they attend for youth. The map below displays the distribution of RUCA areas across Washington State.



Economic Estimates

Considerable work has been done at the national level to estimate the economic burden of asthma on the health care system, and on society as a whole. The most recent comprehensive study of asthma costs estimated national costs for 1998 to be \$12.7 billion (Weiss and Sullivan, 2001). This comprised \$7.4 billion in direct expenditures (hospital care, physicians services and prescription drugs), and \$5.3 billion in indirect costs (school days lost, loss of work, housekeeping, and mortality).

Cost estimates for Washington State were derived using the ratio of asthma prevalence for the nation and Washington. We generated 2002 cost estimates for the state of Washington by using the relative proportions of persons with asthma in Washington and the US and applying that proportion to updated direct and indirect national cost estimates.

The methods described by Weiss and Sullivan were used to update cost estimates from their 1998 publication to 2002 dollars. Costs were updated to year 2002 dollars in two ways: (1) Medical costs were adjusted upwards using separate Consumer Price Index annual percent change figures for components of medical care (inpatient hospital care, outpatient care, physician services and prescription drugs): www.cdc.gov/nchs/data/has/has02.pdf and www.bls.gov/cpi/cpid02av.pdf; (2) Indirect costs were adjusted using annual percent change in wage and salary disbursements published by the US Census Bureau: www.census.gov/prod/www/statistical-abstract-us.html.

References and Data Sources:

- Weiss KB, Sullivan SD. The health economics of asthma and rhinitis. I. Assessing the economic impact. *J Allergy Clin Immunol* 2001;107:3-8.
- Population figures for 2002 for both Washington and the US were obtained from US Census Bureau projections
<http://www.census.gov/popest/states/asrh/SC-EST2003-02.html>
<http://www.census.gov/popest/national/asrh/NC-EST2003-as.html>
- Washington asthma prevalence figures were obtained from Washington State BRFSS data and the Healthy Youth Survey (2002), and 2002 US prevalence was obtained from the National Health Interview Survey (2002).

Definition of Obesity/Overweight

Obesity is an abnormally high amount of body fat in relation to lean body mass. The Centers for Disease Control and Prevention defines obesity in adults as a body mass index (BMI) of 30 or greater. Overweight is defined as a BMI of 25-29.9. Body mass index is based on an individual's height and weight, and is calculated by dividing weight in kilograms by height in meters squared. Of BRFSS respondents: a typical woman 5 feet 5 inches tall with a normal BMI weighed 130 pounds, a typical woman considered

overweight based on BMI weighed 160 pounds, and a typical obese woman weighed 200 pounds. For example, a typical man 5 feet 11 inches tall with a normal BMI weighed 160 pounds, a typical overweight man weighed 190 pounds, and an obese man weighed 235 pounds.

Following CDC protocols used in the national Youth Risk Behavior Survey (YRBS), Healthy Youth Survey respondents were classified as “obese” if their weight was above the 95th percentile (although this category is typically named as “overweight” in the YRBS), and “overweight” (called “at risk for overweight” in the YRBS) for the 85-95th percentiles in BMI from the NHANES normal values determined in the 1970’s. There is currently no accepted CDC definition of obesity for children. Names for youth weight categories were changed in this report to make them consistent with adult categories.

Healthy People 2010

Healthy People 2010 is a document that provides national health promotion and disease prevention objectives. These objectives were developed under the aegis of the United States Department of Health and Human Services incorporating input from federal, state, and local agencies and extensive public comment. Additional information about *Healthy People 2010* goals can be found at <http://www.healthypeople.gov/>

Where possible, we have provided information on Washington data related to *Healthy People 2010*.

Race and Hispanic Ethnicity

Although there are diseases for which “race” and “ethnic group” are markers for genetic factors (such as malignant melanoma or sickle cell anemia), most scientists do not believe that race and ethnicity are biological constructs. Rather, in explaining the relationships of race and ethnicity to human health, race and ethnicity are best viewed as proxies for the effects of complex social, cultural, economic, and political factors.

The U.S. Census Bureau uses the concept of race to reflect self-identification and not to denote any clear-cut scientific definition of biological stock. As with the U.S. Census, race as collected by the systems used to generate data for this document is not intended to denote a clear-cut definition of biological stock. For some systems, the race data reflect self-classification by people according to the race with which they most closely identify. For other systems someone else reports the race of the person. These reports are most likely to reflect the race with which the person most closely identifies when the person reporting the race knows or knew the person well, such as when next-of-kin report race on a death certificate. At times, someone who does not know the person well makes a judgment about the person’s race, such as when a health care worker records race in a medical chart without first asking the person. In these instances, the race may not represent that with which the person most closely identifies.

Ethnicity, as used by the U.S. Census Bureau, refers to “the ancestry, nationality group, lineage, or country of birth of the person or the person's parents or ancestors before their arrival in the United States.” People of Hispanic or Latino ethnicity have their origins in a Hispanic or Spanish-speaking country such as Mexico or Cuba, or the Spanish-speaking countries of Central or South America. People of Hispanic ethnicity can be of any race. Following national guidelines, most data systems currently separate Hispanic ethnicity from race. They generally first ask about Hispanic ethnicity. For example, the Behavioral Risk Factor Surveillance system asks, “Are you Hispanic or Latino?” It then asks about race.

Federal guidelines currently specify five racial categories including American Indian or Alaska Native, Asian, black or African American, Native Hawaiian or other Pacific Islander, and white. Until the 1997 revisions, federal guidelines grouped Asians and Pacific Islanders. The 1997 revisions were used in the 2000 U.S. Census, but most states, including Washington, did not adopt these conventions until 2003.

In some instances where we could not develop Washington State data by race we provided information on differences in race from the scientific literature or from previously published Washington State reports. Readers should be advised that this information must be interpreted with caution. Racial patterns in Washington might be different from those seen elsewhere and differences by race in previously published reports might have been due to under- or overestimating the number of people in different racial groups. See [Guidelines for Using Racial and Ethnic Groups in Data Analyses](http://www.doh.wa.gov/Data/Guidelines/Raceguide1.htm) (<http://www.doh.wa.gov/Data/Guidelines/Raceguide1.htm>) for a more detailed discussion of these issues.

Secondhand Smoke (SHS)-Attributable Asthma

For this report, we used an incidence-based method to calculate the annual number of new asthma cases attributable to secondhand smoke exposure in children five or under.

- Assuming an asthma incidence rate of 1.3% for children age five and under, there are approximately 6,000 new cases of asthma yearly in Washington State.
- Using BRFSS data on the prevalence of exposure to secondhand smoke at home for children five and under (smoking took place in the home on one or more days in the last 30 days in approximately 9% of households with a child in this age range), and the relative risk for asthma induction from exposure to secondhand smoke (2.0), we generated the population attributable risk percent (PAR%) of all new cases of asthma attributable to secondhand smoke exposure (approximately 8%).
- Of the 6,000 new cases of asthma per year in this age group, about 500 are secondhand-smoke attributable.

The U.S. EPA generated estimates of SHS-attributable asthma cases for the 0-17 age population for the nation by calculating a PAR% of 7% to 9% and applying this figure to the average number of prevalent cases for 0-17 year olds. The number of cases (2 million to 5 million) was estimated using 1979-1981 NHIS data (these figures correspond to an asthma prevalence of approximately 3% and 8%). The final annual estimates ranged

between 8,000 and 26,000 for secondhand smoke-attributable cases. For further details on the EPA calculations, see the report referenced below.

Using a US-Washington population ratio, the EPA estimates suggest approximately 200 to 600 cases annually in Washington. Since Washington's asthma prevalence for children is closer to 8%, we would consider the upper range of the EPA estimate to be more valid for Washington. The estimated cases are similar for two different age groups (0-5 and 0-18) because asthma incidence drops precipitously after age five, and the majority of new cases occur among children five and under.

References and data sources:

- Population estimates: US Census 2000.
- Prevalence of exposure: Washington BRFSS 2003.
- Asthma incidence rates: Yunginger JW, Reed CE, O'Connell EJ, Melton LJ 3rd, O'Fallon WM, Silverstein MD. A community-based study of the epidemiology of asthma. Incidence rates, 1964-1983. *Am Rev Respir Dis.* 1992 Oct;146(4):888-94.
- EPA estimates: USDHHS. Respiratory Health Effects of Passive Smoking: Lung Cancer and other Disorders. The Report of the U.S. Environmental Protection Agency. Smoking and Tobacco Control Monograph No. 4. Bethesda, MD. U.S. Department of Health and Human Services, National Institutes of Health, U.S. Environmental Protection Agency, NIH Pub. No. 93-3605, 1993.

Appendix D: County-level Asthma Population Estimates

Geographic Area	Total Population			Asthma Prevalence		People with Asthma (rounded to nearest 100)		
	Age 0 to 17	Age 18+	Total	Age 0 -17	Age 18+	Age 0 - 17	Age 18+	Total
Washington	1,513,843	4,380,278	5,894,121	8%	9.1%	121,100	398,600	519,700
Adams County	5,613	10,815	16,428	8%	7.0%	400	800	1,200
Asotin County	5,241	15,310	20,551	8%	11.7%	400	1,800	2,200
Benton County	42,359	100,116	142,475	8%	7.8%	3,400	7,800	11,200
Chelan County	18,636	47,980	66,616	8%	8.3%	1,500	4,000	5,500
Clallam County	14,170	50,355	64,525	8%	7.3%	1,100	3,700	4,800
Clark County	98,985	246,253	345,238	8%	8.8%	7,900	21,700	29,600
Columbia County	973	3,091	4,064	8%	24.0%	100	700	800
Cowlitz County	24,905	68,043	92,948	8%	9.2%	2,000	6,300	8,300
Douglas County	9,602	23,001	32,603	8%	4.6%	800	1,100	1,800
Ferry County	1,951	5,309	7,260	8%	8.2%	200	400	600
Franklin County	17,076	32,271	49,347	8%	5.6%	1,400	1,800	3,200
Garfield County	622	1,775	2,397	8%	25.9%	<100	500	500
Grant County	23,934	50,764	74,698	8%	5.4%	1,900	2,700	4,700
Grays Harbor County	17,251	49,943	67,194	8%	11.2%	1,400	5,600	7,000
Island County	18,243	53,315	71,558	8%	8.9%	1,500	4,700	6,200
Jefferson County	5,138	20,815	25,953	8%	10.0%	400	2,100	2,500
King County	390,646	1,346,388	1,737,034	8%	8.3%	31,300	111,800	143,000
Kitsap County	62,064	169,905	231,969	8%	9.2%	5,000	15,600	20,600
Kititas County	6,864	26,498	33,362	8%	4.7%	500	1,200	1,800
Klickitat County	5,188	13,973	19,161	8%	10.5%	400	1,500	1,900
Lewis County	18,205	50,395	68,600	8%	7.5%	1,500	3,800	5,200
Lincoln County	2,574	7,610	10,184	8%	4.0%	200	300	500
Mason County	11,619	37,786	49,405	8%	12.2%	900	4,600	5,500
Okanogan County	10,946	28,618	39,564	8%	10.5%	900	3,000	3,900
Pacific County	4,500	16,484	20,984	8%	7.8%	400	1,300	1,600
Pend Oreille County	3,084	8,648	11,732	8%	16.6%	200	1,400	1,700
Pierce County	190,569	510,251	700,820	8%	8.4%	15,200	42,900	58,100
San Juan County	2,695	11,382	14,077	8%	9.6%	200	1,100	1,300
Skagit County	27,082	75,897	102,979	8%	6.1%	2,200	4,600	6,800
Skamania County	2,624	7,248	9,872	8%	4.5%	200	300	500
Snohomish County	166,139	439,885	606,024	8%	8.5%	13,300	37,400	50,700
Spokane County	107,500	310,439	417,939	8%	9.9%	8,600	30,700	39,300
Stevens County	11,497	28,569	40,066	8%	15.0%	900	4,300	5,200
Thurston County	52,527	154,828	207,355	8%	8.2%	4,200	12,700	16,900
Wahkiakum County	896	2,928	3,824	8%	2.4%	100	100	100
Walla Walla County	13,562	41,618	55,180	8%	12.8%	1,100	5,300	6,400
Whatcom County	40,247	126,567	166,814	8%	7.8%	3,200	9,900	13,100
Whitman County	7,365	33,375	40,740	8%	7.8%	600	2,600	3,200
Yakima County	70,751	151,830	222,581	8%	6.5%	5,700	9,900	15,500

- Population estimates from Census 2000
- Asthma prevalence for ages 0-17 based on parent-reported estimates for ages 0-17 combined from BRFSS 1999-2000 combined; the state estimate is assumed for all counties (Healthy Youth Survey data are only available for grades 6-12, about ages 10-18)
- Adult asthma prevalence estimated using BRFSS 2001-2003 combined
- Number of people with asthma estimated by multiplying prevalence estimates and population estimates, rounded to the nearest 100.